three hours old, remove a pellet wedged in tightly between the fork of stemapods, and toss it far away with its mouth parts. In so doing it moved the extensile part of "tails" vigorously up and down. Whenever a larva large or small had to be removed from breeding cage for purposes of noting changes, the stemapods always moved to and fro in a very lively manner. It appears that it might be to frighten enemies. Whenever a larva, while in process of making cocoon, was disturbed, especially before completely housed in it, would endeavor to spin it elsewhere. Even the change from perpendicular of breeding jar to that of horizontal final depository, would cause it to make the attempt. One larva left its cocoon and transformed into pupa in an envelope box.

General Observation.—The first molt of larva occurred in from 7 to 7½ days. Second molt in 15 days. Third molt in 21 days and over. Warm temperature, and moisture seems to facilitate some of the stages. Cool weather much retards the time between stage IV, and pupating. One larva commenced to make its cocoon when only twenty-six days old, and others when from four to five weeks old. After ceasing to feed, the larva rests a day or longer and contracts in size before the last transformation takes place. A week after second molt the color of the dorsal band or diamond patches, changes from chocolate brown to lilac brown, which in certain lights varies from amethystine to purplish tints. Two annual broods occur in Arizona, the pupa of autumn brood hibernating.

PRELIMINARY LIST OF THE DRAGONFLIES OF STATEN ISLAND, WITH NOTES AND DATES OF CAPTURE.

By Wm. T. Davis.

There are no large, clear ponds on Staten Island like Echo Lake and Green Pond in northern New Jersey, and consequently the dragonflies that make such bodies of water their home, are not to be found on the Island. The sub-family Libellulinæ, however, seems to be well represented and all but two of the species mentioned by Mr. Philip P. Calvert in his Catalogue of the Dragonflies of the Vicinity of Philadelphia, page 267, are here recorded.

Thanks are due to Mr. Calvert for identifying species, or passing upon identifications already made, and at his suggestion I have indicated, by placing an asterisk before their names, the seven dragonflies which are additions to the list of "The Odonata of New York

State," published in this JOURNAL, Vol. III, pp. 39–48 and Vol. V, pp. 91–95.

Subfamily CALOPTERYGINÆ.

Calopteryx maculata *Beauv.* Common along the banks of brooks in July and August.

Subfamily AGRIONINÆ.

Lestes congener *Hagen.* September.

Lestes unguiculata *Hagen.* On July 15, 1894, several females were ovipositing in the stems of grasses growing on the edge of one of the Four Corners iron mine ponds.

Lestes forcipata *Rambur.* May, June, August.

Lestes rectangularis *Say.* June, July, August.

***Lestes inequalis** *Walsh.* July.

Argia violacea *Hagen.* July, August.

***Argia apicalis** *Say.*

***Nehalennia posita** *Hagen.* June, July, August.

Amphiagrion saucium *Burmeister.* June, August.

Enallagma civile *Hagen.* June, August, September.

Enallagma aspersum *Hagen.* June, July, August.

Enallagma signatum *Hagen.* June, August.

Ischnura verticalis *Say.* May, June, July, August.

Ischnura ramburii *Selys.* September, October.

Anomalagrion hastatum *Say.* July, September.

Subfamily GOMPHINÆ.

Gomphus exilis *Selys.* May, June, July.

Gomphus villosipes *Selys.* June.

***Cordulegaster maculatus** *Selys.* Richmond. May 30, 1890.

Subfamily ÆSCHNINÆ.

Epiæschna heros *Fabricius.* May, June, July, August. On the 7th of June, 1885, at 8.35 P. M., one of these insects flew into my open window. There was a light in the room at the time. The female has been observed on the 28th of July laying eggs in dead, water-soaked branches lying in swampy pools in the woods.

Boyeria vinosa *Say.* July (September. N. J.)

Basiæschna janata *Say.* One male. May 2d.

Æschna juncea *L.* var. **verticalis** *Hagen.* June, September, October. On the 21st of October, 1882, in the Clove Valley, one of

these dragon flies was seen to crawl down a stick lying in the water until it was entirely below the surface of the pool, as recorded in Entomologica Americana, Vol. I, p. 18.

Æschna constricta *Say*. June, September, October. On August 26, 1894, about six P. M., several hundred dragon flies were seen flying westward over Slosson's Lane, West New Brighton. They were a species of *Æschna* as I could see with my glass, but none flew low enough to permit of capture.

Anax junius *Drury*. April 9, 1893, plentiful at Watchogue. May, June, July, August and September. In copula May 5.

* **Anax longipes** *Hagen*. Clove Valley, June 5, 1881; August, 9, 1885. Also at Orange, N. J.

Subfamily CORDULINÆ.

Tetragoneuria cynosura *Say*. May, June, July.

Subfamily LIBELLULINÆ.

* **Pantala flavescens** *Fabricius*. July, August, September. July 30, 1887, at New Brighton. On July 31, 1887, there were many specimens near the reservoir of the Crystal Water Company at Four Corners, nearly all of them keeping over a field of oats. They were quite difficult to capture, except those newly emerged from the pupæ, and all that were seen closely were males.

Tramea carolina *Linné*. May, June, July, August, September On July 15, 1894, a male *Tramea carolina* was flying over one of the Four Corners iron mine ponds. Soon a female came and commenced dipping her abdomen into the water. In a moment she was seized by the male and they flew away. In a half hour they were back and went flying about together, the male now and then suddenly letting go his hold and with equal rapidity catching the female again by the neck. Other male dragonflies flew after them and when the female stopped to lay eggs, they annoyed her considerably. The chief among the disturbers was a *Libellula basalis*. After a time the male *Tramea* left his mate and she was quickly seized by the aforesaid *Libellula basalis*, after which they flew about together for a considerable time. After letting go his hold once and flying down the pond, the *L. basalis* returned and seized the *Tramea* a second time.

Tramea lacerata *Hagen*. May, June, July, August, September. Often quite abundant on the salt meadows.

Libellula basalis *Say*. June, July.

Libellula auripennis *Burmeister*. May, June, July.

Libellula cyanea *Fabricius*. June, July, August.

Libellula exillena *Westwood*, form **vibrans** (*Fabricius ?*) Kirby. Not uncommon on the Island in August, 1894; much less common in July, 1895.

Libellula exillena *Westwood*, form* **incesta** *Hagen*. July, August.

Libellula quadrimaculata *Linné*. Arlington, May 11, 1889, and plentiful June 19, 1893.

Libellula semifasciata *Burmeister*, April 25, 1896. May, June, July, August, September.

Libellula pulchella *Drury*. May, June, July, August, September.

Plathemis trimaculata *De Geer*. May, June, July, August, September.

Micrathyria berenice *Drury*. May, June, July, August. Often of a quiet summer evening countless numbers of this species will be seen settled on the grass stems in the salt meadows, in which position they spend the night. When they are particularly abundant the July crop of mosquitoes is speedily reduced in numbers, being devoured at head-quarters.

Nannothemis bella *Uhler*. June and July, 1888, at the Four Corners iron mine ponds.

Celithemis elisa *Hagen*. June, July, August.

Celithemis eponina *Drury*. May, July.

Leucorhinia intacta *Hagen*. May, June.

Diplax rubicundula *Say*. July, August, September.

Diplax obtrusa *Hagen*. July.

Diplax semicincta *Say*. July 15, 1894. Four Corners iron mine ponds.

Diplax vicina *Hagen*. September, October, November. While my companion and I were sitting in the sun on October 21, 1892, five of these dragonflies at one time lit upon us, wishing to sun themselves also. Some lit on my hands—one on the end of my thumb. The dragonflies are most attracted if you have on light colored garments, or a newspaper spread on the ground is a favorite resting place.

Diplax corrupta *Hagen*. Shore at Eltingville, May 27, 1896. (See this JOURNAL, Vol. V, p. 95.)

Perithemis domitia *Drury*. June, July.

Mesothemis simplicicollis *Say*. June, July, August.

Pachydiplax longipennis *Burmeister*. June, July, August, September.